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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/031,408	01/18/2002	Kenji Tsukada	Q68137	2132

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Washington, DC 20037-3202

EXAMINER

LIANG, LEONARD S

ART UNIT

PAPER NUMBER

2853

DATE MAILED: 06/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/031,408

Applicant(s)

TSUKADA ET AL.

Examiner

Leonard S Liang

Art Unit

2853

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 February 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-63 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-63 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 09 April 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Specification and Drawings

1. The lengthy specification and drawings have not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification and drawings.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-12, 22-32, 33-45, 57-58, 61, and 63 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1, 57-58, and 63 disclose an ink (consumption condition) detection **method**. However, the claim itself does not contain any method or process limitations, only **structure** limitations. These structure limitations do not further limit the claimed method. It is not clear exactly what the applicant's invention is drawn to, a method or an apparatus. For this reason, no art rejection is made for claim 1 at this time.

Claims 2-12, 22-32, 36-45, and 61 depend from rejected claim 1.

Claim 33 discloses an ink consumption condition detection **method**. However, the claim itself does not contain any method or process limitations, only **structure** limitations. These structure limitations do not further limit the claimed method. It is not clear exactly what the applicant's invention is drawn to, a method or an apparatus. For this reason, no art rejection is made for claim 33 at this time.

Claims 34-35 depend from rejected claim 33.

Claim Rejections - 35 USC § 102

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The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 46, 51, 56, and 59 are rejected under 35 U.S.C. 102(b) as being anticipated by Kurihara et al (JP Pat 10305590).

Kurihara et al discloses:

- {claim 46} a recording head configured to jet ink drops; an ink cartridge configured to feed ink to the recording head; a piezo-electric device having a piezo-electric element configured to detect an ink consumption condition in the ink cartridge, the piezo-electric device further having a vibrating plate on one side of which the piezo-electric element is arranged, and a cavity forming member having a cavity which is arranged on the other side of the vibrating plate, the vibrating plate being able to come in contact with the liquid in the liquid container via the cavity; and a control unit for controlling the piezo-electric device so as to detect the ink consumption condition when the recording head is in a non-recording state (Detailed Description, paragraph 0001, 0002, 0013)
- {claim 51} the piezo-electric device has a piezo-electric element mounted on the ink cartridge (figure 3, reference 6)
- {claim 56} An ink jet recording apparatus comprising a recording head; an ink cartridge; a piezo-electric device; a control unit; the piezo-electric device has a piezo-electric element mounted on the outside of the ink cartridge (abstract; figure 1-2; Detailed Description paragraph 0013)
- {claim 59} An ink jet recording apparatus; a recording head; an ink cartridge; a piezo-electric device; a control unit, wherein the piezo-electric device has a vibration part including a piezo-electric element (abstract; figure 1-2; Detailed Description paragraph 0013); wherein the piezo-electric device measures periodic peak values of a waveform of counter electromotive force generated by

residual vibration remaining in the vibration part by a predetermined number of the periodic peak values from a predetermined point of time, and the piezo-electric device measures more number of the periodic peak values than the predetermined number of the periodic peak values in subsequent detection of the ink consumption condition, and thereby detects the ink consumption condition, and a storage unit for storing the ink consumption condition in which the ink cartridge which is detected by the piezo-electric device (Detailed Description paragraph 0002, 0004, 0015, 0017)

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Note: For claims 13-21, the structure limitations of the ink consumption condition detection method do not manipulate the claimed process, and thus do not further limit the claimed invention

4. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kurihara et al (JP Pat 10305590) in view of Kato (US Pat 6347853), Nakano et al (JP Pat 11010909), and Nakano et al (US Pat 6012794).

Kurihara et al discloses, with respect to claim 13, a consumption condition detection step (abstract; figure 1-2; Detailed Description paragraph 0013)

Kurihara et al differs from the claimed invention in that it does not disclose a reconfirming step; a carriage moving step; a consumption condition redetection step, wherein the carriage moving step moves the carriage at a faster speed than a speed for moving the carriage during a recording operation.

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Kato discloses, with respect to claim 13, a reconfirming step (column 2, lines 1-5); a consumption condition redetection step (column 2, lines 56-60).

Nakano et al (JP Pat 11010909) discloses, with respect to claim 13, a carriage moving step (Detailed Description, paragraph 0067).

Nakano et al (US Pat 6012794) discloses, with respect to claim 13, the carriage moving step moves the carriage at a faster speed than a speed for moving the carriage during a recording operation (column 1, lines 55-67; claim naturally suggested).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teachings of Kato into the invention of Kurihara et al. The motivation for the skilled artisan in doing so is to gain the benefit of minimizing erroneous ink level determinations (column 2, lines 11-14).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teachings of Nakano et al (JP Pat 11010909) into the invention of Kurihara et al. The motivation for the skilled artisan in doing so is to gain the benefit of being able to print with the residual ink in the cartridge, even when detection means state that the cartridge is empty (Detailed Description, paragraph 0067).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teachings of Nakano et al (US Pat 6012794) into the invention of Kurihara et al. The motivation for the skilled artisan in doing so is to gain the benefit of controlling the carriage speed in accordance with the monitoring result of the residual-ink detection, thus providing a printing apparatus capable of residual-ink detection with high-precision (column 1, lines 34-40; column 1, lines 55-67).

5. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kurihara et al (JP Pat 10305590) in view of Kato (US Pat 6347853), Nakano et al (JP Pat 11010909), and Furukawa (US Pat 4337470).

Kurihara et al discloses, with respect to claim 13, a consumption condition detection step (abstract; figure 1-2; Detailed Description paragraph 0013)

Kurihara et al differs from the claimed invention in that it does not disclose a reconfirming step; a carriage moving step; a consumption condition redetection step, wherein a shock is given to the ink cartridge during moving the carriage by the carriage moving step.

Kato discloses, with respect to claim 14, a reconfirming step (column 2, lines 1-5); a consumption condition redetection step (column 2, lines 56-60).

Nakano et al (JP Pat 11010909) discloses, with respect to claim 14, a carriage moving step (Detailed Description, paragraph 0067).

Furukawa discloses, with respect to claim 14, a shock is given to the ink cartridge during moving the carriage by the carriage moving step.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teachings of Kato into the invention of Kurihara et al. The motivation for the skilled artisan in doing so is to gain the benefit of minimizing erroneous ink level determinations (column 2, lines 11-14).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teachings of Nakano et al (JP Pat 11010909) into the invention of Kurihara et al. The motivation for the skilled artisan in doing so is to gain the benefit of being able to print with the residual ink in the cartridge, even when detection means state that the cartridge is empty (Detailed Description, paragraph 0067).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teachings of Furukawa into the invention of Kurihara et al. The motivation for the skilled artisan in doing so is to gain the benefit of oscillation to the ink, thus causing ejection from the head (column 1, lines 30-35).

6. Claims 15-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kurihara et al (JP Pat 10305590) in view of Kato (US Pat 6347853) and Nakano et al (JP Pat 11010909).

Kurihara et al discloses, with respect to claims 15-18, a consumption condition detection step (abstract; figure 1-2; Detailed Description paragraph 0013)

Kurihara et al differs from the claimed invention in that it does not disclose:

- {claims 15-19} a reconfirming step; a carriage moving step; a consumption condition redetection step

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- {claim 15} the consumption condition redetection step is executed when a predetermined time passes after the carriage moving step ends
- {claim 16} the consumption condition redetection step is executed during moving the carriage by the carriage moving step
- {claim 17} the carriage moving step moves the carriage back and forth, and, when the carriage almost returns and moves from a forward path to a backward path, the consumption condition redetection step redetects the ink consumption condition
- {claim 18} the carriage moving step moves the carriage back and forth, and, immediately after the carriage ends moving on a forward path and starts moving on a backward path, the consumption condition redetection step redetects the ink consumption condition
- {claim 19} the reconfirmation step is executed several times during moving the carriage by the carriage moving step, and presence or absence of ink in the ink cartridge is decided on the basis of detection results of the reconfirmation steps

Kato discloses, with respect to claim 14, a reconfirming step (column 2, lines 1-5); a consumption condition redetection step (column 2, lines 56-60).

Nakano et al (JP Pat 11010909) discloses, with respect to claim 14, a carriage moving step (Detailed Description, paragraph 0067).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teachings of Kato into the invention of Kurihara et al. The motivation for the skilled artisan in doing so is to gain the benefit of minimizing erroneous ink level determinations (column 2, lines 11-14).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teachings of Nakano et al (JP Pat 11010909) into the invention of Kurihara et al. The motivation for the skilled artisan in doing so is to gain the benefit of being able to print with the residual ink in the cartridge, even when detection means state that the cartridge is empty (Detailed Description, paragraph 0067).

The combination of Kurihara et al in view of Kato and Nakano et al naturally suggests the limitations of claims 15-19, depending on the amount of elapsed time.

7. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kurihara et al (JP Pat 10305590) in view of Kato (US Pat 6347853) and Nakano et al (JP Pat 11010909), as applied to claim 19 above, and further in view of Kurosawa (US Pat 5900888).

Kurihara et al, as modified, differs from the claimed invention in that it does not disclose that the reconfirmation step is executed several times, and, when presence of ink is detected in the consumption condition redetection step more than a predetermined count, it is decided that ink exists in the ink cartridge.

Kurosawa discloses that the reconfirmation step is executed several times, and, when presence of ink is detected in the consumption condition redetection step more than a predetermined count, it is decided that ink exists in the ink cartridge.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teachings of Kurosawa into the invention of modified Kurihara et al. The motivation for the skilled artisan in doing so is to gain the benefit of detecting the amount of residual ink with high precision and without fine adjustment (column 1, lines 41-43).

8. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kurihara et al (JP Pat 10305590) in view of Kato (US Pat 6347853) and Nakano et al (JP Pat 11010909), as applied to claim 19 above, and further in view of Froger et al (US Pat 6438500).

Kurihara et al, as modified, differs from the claimed invention in that it does not disclose that the reconfirmation step is executed several times, and presence or absence of ink in the ink cartridge is decided on the basis of a mean value of measured results of the consumption condition redetection steps.

Froger et al discloses that the reconfirmation step is executed several times, and presence or absence of ink in the ink cartridge is decided on the basis of a mean value of measured results of the consumption condition redetection steps (abstract).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teachings of Froger et al into the invention of modified Kurihara. The motivation for the skilled artisan in doing so is to gain the benefit of determining the absence of product in at least one reservoir, with a satisfactory reliability and accurately, while being simple and economical to implement (column 2, lines 61-65).

9. Claims 47-48 are rejected under 35 U.S.C. 102(b) as being anticipated by Kurihara et al (JP Pat 10305590) in view of Hoshino (JP Pat 07137291).

Kurihara et al discloses:

- {claims 47-48} an ink jet recording apparatus (as applied to claim 46)
- {claim 48} the piezoelectric device has a vibration part including a piezo-electric element (figure 1-2, reference 3, 6)

Kurihara et al differs from the claimed invention in that it does not disclose:

- {claim 47} the piezo-electric device detects changes in acoustic impedance, and thereby detects the ink consumption in the ink container
- {claim 48} the piezo-electric device detects changes in the acoustic impedance on the basis of counter electromotive force generated by residual vibration remaining in the vibration part, thereby detecting the ink consumption container in the ink container

Hoshino discloses:

- {claim 47} the piezo-electric device detects changes in acoustic impedance, and thereby detects the ink consumption in the ink container (Detailed Description, page 1, lines 36-38; page 2, line 1)
- {claim 48} the piezo-electric device detects changes in the acoustic impedance on the basis of counter electromotive force generated by residual vibration remaining in the vibration part, thereby detecting the ink consumption container in the ink container (Detailed Description page 1, lines 36-38; page 2, line 1)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teachings of Hoshino into the invention of Kurihara et al.

The motivation for the skilled artisan in doing so is to gain the benefit of obtaining a detection system with high detection sensitivity and a reliable judgment (page 1, paragraph 0006).

10. Claims 49-50, 55, and 60 are rejected under 35 U.S.C. 102(b) as being anticipated by Kurihara et al (JP Pat 10305590) in view of Ujita et al (US Pat 5506611).

Kurihara et al discloses, with respect to claims 49-50, an ink jet recording apparatus (as applied to claim 46).

Kurihara et al differs from the claimed invention in that it does not disclose:

- {claim 49} a storage unit of storing the ink consumption condition in the ink cartridge which is detected by the piezo-electric device
- {claims 50, 55, and 60} the storage unit is mounted on the ink cartridge

Ujita et al discloses:

- {claim 49} a storage unit of storing the ink consumption condition in the ink cartridge which is detected by the piezo-electric device (figure 10, reference 22; column 7-10)
- {claims 50, 55, and 60} the storage unit is mounted on the ink cartridge (figure 10, reference 22; column 7-10)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teachings of Ujita et al into the invention of Kurihara et al. The motivation for the skilled artisan in doing so is to gain the benefit of providing an ink cartridge to which is imparted information for controlling the driving conditions of a recording head on the basis of the ink used (column 7, lines 6-10).

11. Claim 52 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kurihara et al (JP Pat 10305590) in view of Kato (US Pat 6347853).

Kurihara et al discloses an ink jet recording apparatus (as applied to claim 46).

Kurihara et al differs from the claimed invention in that it does not disclose a carriage moving with the recording head and the ink cartridge both of which are loaded on the carriage, wherein the control unit controls the piezo-electric device so as to redetect the ink consumption

condition in the ink cartridge after the piezo-electric device detects absence of ink in the ink cartridge when the recording head is in a non-recording state.

Kato discloses a carriage moving with the recording head and the ink cartridge both of which are loaded on the carriage (column 1, lines 61-67), wherein the control unit controls the piezo-electric device so as to redetect the ink consumption condition in the ink cartridge after the piezo-electric device detects absence of ink in the ink cartridge when the recording head is in a non-recording state (column 2, lines 1-5).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teachings of Kato into the invention of Kurihara et al. The motivation for the skilled artisan in doing so is to gain the benefit of minimizing erroneous ink level determinations (column 2, lines 11-14).

12. Claim 53 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kurihara et al (JP Pat 10305590) in view of Kato (US Pat 6347853), as applied to claim 52, and further in view of Nakano et al (JP Pat 11010909).

Kurihara et al, as modified, discloses controlling the piezo-electric device so as to redetect the ink consumption condition in the ink cartridge in predetermined timing (as applied to claim 52).

Kurihara et al, as modified, differs from the claimed invention in that it does not disclose the control unit moves the carriage after detection of absence of ink in the ink cartridge by the piezo-electric device.

Nakano et al (JP Pat 11010909) discloses the control unit moves the carriage after detection of absence of ink in the ink cartridge by the piezo-electric device.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teachings of Nakano et al (JP Pat 11010909) into the invention of modified Kurihara et al. The motivation for the skilled artisan in doing so is to gain the benefit of being able to print with the residual ink in the cartridge, even when detection means state that the cartridge is empty (Detailed Description, paragraph 0067).

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13. Claims 54 and 62 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kurihara et al (JP Pat 10305590) in view of Kato (US Pat 6347853) and Nakano et al (JP Pat 11010909), as applied to claim 53, and further in view of Furukawa (US Pat 4337470).

Kurihara et al, as modified, differs from the claimed invention in that it does not disclose a shock unit giving a shock to the ink cartridge during movement of the carriage.

Furukawa discloses, with respect to claims 54 and 62, a shock unit giving a shock to the ink cartridge during movement of the carriage (figure 2, reference 18; column 1, lines 31-48; vibrator serves as shock unit).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the teachings of Furukawa into the invention of modified Kurihara et al. The motivation for the skilled artisan in doing so is to gain the benefit of oscillation to the ink, thus causing ejection from the head (column 1, lines 30-35).

Response to Arguments


14. Applicant's arguments with respect to claims 1-63 have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Leonard S Liang whose telephone number is (703) 305-4754. The examiner can normally be reached on 8:30-5 Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Russ Adams can be reached on (703) 308-2847. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7724 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

lsl LSL
May 22, 2003


JUDY NGUYEN
PRIMARY EXAMINER